Brief for GSDR – 2016 Update

Role of Science, Technology & Innovation in Urban Frameworks: Enhancing the Science-Policy-Practice Interface for Resilient Cities

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Towards a New Urban Agenda

Over the past few decades, since Habitat II in Istanbul in 1996, there has been unprecedented growth of urban and peri-urban spaces. We have witnessed major demographic, industrial, and epidemiological transitions that have led to fast changing urban landscapes. Last year, the urban population surpassed 50%, despite covering only approximately 2% of total land. By 2050, this number is expected to rise to 84 % of the world population, from 3.4 billion in 2009 to 6.3 billion in 2050 [1]. This will contribute close to a 50% increase in municipality solid waste (MSW) in 2025 and 50% increase in global greenhouse gas (GHG) emissions in 2050, in large part due to 70% growth in energy-related CO2 emissions [2]. GHGs are expected to reach well over 685 parts per million (ppm) CO2-equivalents by 2050. As a consequence, global average temperature is projected to increase by 3.0-6.0 degrees Celsius by the end of the century, exceeding the internationally agreed goal of limiting it to 2 degrees Celsius [3].

Looking onward to Quito, Ecuador later this year, the United Nations Conference on Housing and Sustainable Urban Development - Habitat III will take place between 17-20 October, 2016. One of the first major intergovernmental conferences following the adoption of the Sustainable Development Goals in September 2015, it seeks to adopt a comprehensive agenda for the implementation, monitoring, follow-up, and review of SDG 11 in particular, and respond to the test of implementing all SDGs in cities by 2030.

The changing urban landscape presents both an opportunity and challenge for attaining prosperous and resilient communities. Since the battle for a sustainable future will be won or lost in cities, the way in which cities are designed, planned, built, and managed today will determine the outcomes of our efforts towards a harmonious, resilient, and inclusive landscape for people, planet, prosperity, peace, and partnerships [4]. The New Urban Agenda (NUA) seeks to put forth practical policy recommendations to help steer urban development in the right direction, through participatory mechanisms for all stakeholders to engage. The “three-legged” approach: local fiscal systems, urban planning, and basic services and infrastructure will be central to the NUA [5, 6]. This includes a robust urban economic development plan, while minimizing inequities between and within countries, as well as between urban, peri-

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urban, and rural areas. It further integrates sustainable environmental and economic opportunities for all [5, 7].

Coherence Among Science & Technology Roadmaps

The science-policy interface (SPI) has become an increasingly important aspect of sustainable development policy design, implementation, follow-up, monitoring and review. The Rio+20 outcome document - *The Future We Want* - solidified the role of the SPI and sought to operationalize its place within all sustainable development processes [8]. Additionally, resolution 67/290 of the High-Level Political Forum seeks to strengthen the SPI by building on existing assessments, enhancing evidence-based decision-making at all levels, and strengthening the capacity-building of statistical capacities [9]. This has also been reflected at the regional level, with the Sixth Framework Program for Research and Technological Development of the European Union (FP6) recognizing SPI as significant for proper environmental governance [10].

Broad political commitments and multi-stakeholder engagement, including UN agencies, Member States, regional and local governments, architects, planners, city dwellers and others are key factors which will determine the success of the NUA [11]. However, operationalization of the policy blueprint provided by the NUA will only be successful by taking data-informed decisions, employing empirically-based methodologies, and approaching implementation, follow-up and review from a scientific lens. Thus, a strong science-policy-practice continuum is crucial to identify the cross-cutting nature of thematic issues, while appropriately responding to current and future needs [12].

This year alone, we have witnessed science, technology, and innovation as key enablers for sustainable development. The 2030 Agenda for Sustainable Development and outcome of the 3rd Financing for Development Conference call for enhanced knowledge sharing, establishment of a technology facilitation mechanism, and wide diffusion of environmentally sound technologies that work within context and capacities of local communities [13, 14]. These will be influential in turning policies into practice, while ensuring implementation programs adopt a data-driven compass, to allow for proper pivoting towards more appropriate and durable strategies.

The Science & Technology (S&T) Conference for the Implementation of the Sendai Framework for Disaster Risk Reduction (SFDRR), 2015-2030, took place in January 2016. The outcome of the conference was the launch of a S&T Roadmap and S&T Partnership to support the implementation, monitoring, and review for each of the four priority areas. The S&T Roadmap seeks to strengthen the access to knowledge and evidence to better inform decision making in implementing the framework; promote scientific research of disaster risk patterns, causes and effects; advise on

appropriate technologies, methodologies, and standards for disaster prevention, preparedness, response, recovery, and building-back-better; and identify research and technology gaps for both current and emerging priority areas [15]. For each of the four priority areas in the SFDRR, the S&T Roadmap outlines specific expected outcomes, actions and deliverables which the scientific community can engage in through the S&T Partnership. The roadmap, spanning the 15 years of the SFDRR, serves as a support system for the framework and seeks to provide stakeholders with the necessary tools, technologies, data, and knowledge to ensure empirically-based decision making.

Science-Policy Advice for Urban Resilience

The table below displays the issue areas outlined for discussion during the Habitat III process as a lead-up to the conference in October, complemented with suggestions on where the science-policy interface can help strengthen the outcome of the NUA. Employing tools such as science, technology, and innovation (STIs) and information communication technologies (ICTs) can be influential in achieving the different issue areas below.

Habitat III Issue Areas	Examples of SPI Contributions
1. Social Cohesion and Equity	1.1. Define what 'inclusive' means, proposing both a definition and means to assess it in the NUA. 1.2. Build capacity to ensure all members of society and countries have access to, understand and can use scientific information for better informed decision making. 1.3. Provide evidence on natural and social issues and potentials to support solutions specifically to acknowledge rights to public access, migration and refugees issues, and zoning regulation assessment. 1.4. Research on how to improve quality of life of slum and informal communities. 1.5 Use of ICTs to close the digital divide and allow equal opportunities for all in cities.
2. Urban Frameworks	2.1. Assess current urban law/regulation and terminologies such as 'vulnerable' and 'marginalized' to improve the effectiveness and equitability of law/regulation. 2.2. Assess current mechanisms for the monitoring and evaluation of laws by the public through citizen-generated data. 2.3. Research and propose more effective and permanent structures of dialogue that encourage meaningful participation of scientists, academia, engineers, and practitioners to advise and review urban policy. 2.4. Support the collection of data and enhanced statistical capacity of municipalities to use a more empirically-based

	approach to designing policy, implementation, monitoring and accountability. 2.5. Assessments on Ecological Tax Reform (ETR), Ecological Risk Integration to Sovereign Credit (E-RISC), social and physical infrastructure, while improving upon outdated governance systems.
3. Spatial Development	3.1. Research and inform all about the challenges and opportunities provided by rural and peri-rural areas to promote sustainable urban development. 3.2. Research, assess and inform elements and efforts to build human-oriented settlements that are sustainable, inclusive, and resilient. 3.3. Disseminate information with evidence that equitable and safe public spaces are platforms for civic participation, collaboration, and relationship-building. 3.4. Research on improving urban-rural relationship, especially the role of cities to support small farmers and producers. 3.5. Research on designing interactive natural and social interaction in public spaces. 3.6. Identify and research the roots of public violence.
4. Urban Economy	4.1. Support actions to improve youth capacities. 4.2. Support capacity building of youth (and all social groups) so they can create opportunities for sustainable livelihoods. 4.3. Involve youth in innovation and technology production and distribution. 4.4. Identify potential assets, resources and opportunities to develop and increase job opportunities and inform policy makers to support implementation. 4.5. Support governments to set fair payment standards. 4.6. Establish safety nets and robust labour and environmental standards to ensure that labour is not exploited in the informal sector.
5. Urban Ecology and Environment	5.1. Support government and stakeholders to create consistent and resilient urban policy and implementation mechanisms that inform and enforce environment-friendly urban mechanisms. 5.2. Identify specific resilience behaviors for each city and region, based upon each area's specific vulnerability to hazards. 5.3. Identify comprehensive resilience strategies that involve youth, women and all other stakeholders. This could include identifying resilience in governance systems, health care systems, etc. 5.4. Support local environmentally-friendly initiatives and projects with data and facts to adequately communicate them to the public.

	5.5. Research each city/region's characteristic and capacity to overcome climate challenges. 5.6. Disseminate and make sure the public understands climate change and how they can build resilience. 5.7. Provide understanding of the definitions of "hazard" and "disaster" to the public. 5.8. Create modelling of urban systems based on information and communication technology (ICT) and inform policy makers to incorporate them into urban planning [21]. 5.9. Design inclusive social systems that are prepared to handle striking shocks.
6. Urban Housing and Basic Services	6.1. Disseminate the knowledge aspect of infrastructure as to include local communities, people with disabilities, older persons, indigenous peoples, women youth, and other perspectives in decision making processes. 6.2. Identify active, supportive, accessible, sustainable transportation systems for present and future conditions. 6.3. Identify sustainable housing systems, including design and access for women, youth, people with disabilities, older persons, and others. 6.4. Identify components to create smart cities as to inform policy makers and the public. 6.5. Identify the roots of problems and approaches to address informal settlement issues involving all stakeholders. 6.6. Use of STIs and ICTs to ensure to basics services by all, while performing social, economic, and environmental impact assessments.

*The examples of SPI contributions are collected and adjusted from the UN MGCY's Response to issue papers [16] and World Urban Campaign the City We Need 2.0 [17].

Forward Looking Recommendations

Outlined below are basic recommendations to effectively enhance the science-policy interface for urban settings and to promote greater dialogue among scientists, engineers, practitioners, stakeholders, and their policymaker counterparts:

- Scientists, engineers, and policymakers should transparently incorporate diverse perspectives from stakeholders surrounding the broad range of thematic issues [18].
- Scientists, engineers, and policymakers should maintain close and regular coordination to initiate a continuous dialogue [18].
- Scientists, policymakers and intermediate agents such as the media should conduct regular dialogue at the national level [19].

- Policymakers should reshape their view of scientists, rethinking their crucial role in driving evidence-based and informed decision making [20].
- Scientists should engage local and regional governments through the advising process, as they hold a key role in implementation [18].
- There should be a consensus on 'what is evidence' especially among policymakers, including where and how such evidence should be sought, and at what stage in the policy process different forms of evidence might be more or less appropriate [22].
- Concerted efforts within the scientific community through, sharing best practices and experience-based knowledge [19].
- Set aside funding for research dissemination activities in order to ensure that scientific findings reach relevant end users [19].
- Future research studies and actions should address issues of the grassroots as to promote community involvement and support translation from science to policy action [19].

References

[1] United Nations Department of Economic and Social Affairs (UNDESA) Population Division. (2009). 2 Urban and Rural Areas 2009. Webpage. Retrieved from: http://www.un.org/en/development/desa/population/publications/urbanization/urban-rural.shtml (Accessed in March 15, 2016).

[2] Hoornweg, D., & Bhada-Tata, P. (2012). What a waste: a global review of solid waste management. The World Bank. Retrieved from: http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1334852610766/What_a_Waste2012_Final.pdf (Accessed in March 21, 2016).

[3] The Organisation for Economic Co-operation and Development (OECD). (without date). OECD Environmental Outlook to 2050: The Consequences of Inaction - Key Facts and Figures. Retrieved from: http://www.oecd.org/env/indicators-modelling-outlooks/oecdenvironmentaloutlookto2050theconsequencesofinaction-keyfactsandfigures.htm (Accessed on March 18, 2016).

[4] World Urban Campaign (WUC). (without date). The City We Need. Retrieved from: http://mirror.unhabitat.org/downloads/docs/The%20City%20We%20Need.pdf (Accessed on March 21, 2016).

[5] Citiscope. (without date). What is New Urban Agenda? Explainer. Retrieved from: http://citiscope.org/habitatIII/explainer/2015/06/what-new-urban-agenda#sthash.vLH1z5Vq.dpuf (Accessed on March 15, 2016).

[6] United Nations Human Settlements Programme (UN-Habitat). (2015). Achieving Sustainable Urban Development (ASUD) Showcasing Participatory and Inclusive Land Readjustment (PILaR) Medellin - three

legged approach in action. 25th Session of the governing council, 17-23 April 2015, Nairobi. Retrieved from: http://unhabitat.org/wp-content/uploads/2015/01/Achieving-Sustainable-Urban-Development-ASUD-showcasing-Participatory.pdf (Accessed on March 14, 2016).

[7] United Nations Human Settlements Programme (UN-Habitat). (without date) Vision for Habitat III. UN-Habitat Urban Visions No.3. Retrieved from: http://unhabitat.org/wp-content/uploads/2014/07/UN-Habitat-Urban-Visions-No.3-Vision-for-Habitat-III-2013.pdf (Accessed on March 11, 2016).

[8] United Nations General Assembly. Rio+20, The Future We Want. (2012). Resolution adopted by the General Assembly on 27 July 2012. Retrieved from: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E (Accessed on March 21, 2016).

[9] United Nations General Assembly. (2013). Resolution 67/290, Format and organizational aspects of the high-level political forum on sustainable development. Resolution adopted by the General Assembly on 9 July 2013. Retrieved from: http://www.un.org/en/development/desa/policy/cdp/ARES67290_en.pdf (Accessed on March 21, 2016).

[10] Van den Hove, S. (2007). A rationale for science–policy interfaces. Futures, 39(7), 807-826.

[11] Schreiber, Franziska, Kaj Fischer, Eleni Dellas and Alexander Carius. (2016). Designing the New Urban Agenda: Lessons from International Agreements. Berlin: adelphi.

[12] Andalib Elias, Counsellor at the Permanent Mission of Bangladesh to United Nations *in Global Dialogue for Development.* (2015). UN DESA News Volume 19, No.03 - August 2015. Retrieved from: http://www.un.org/en/development/desa/newsletter/desanews/dialogue/2015/08/index.htm (Accessed on March 16,2016).

[13] United Nations General Assembly. (2015). Transforming our world: the 2030 Agenda for Sustainable Development. Resolution adopted by the General Assembly on 25 September 2015. Retrieved from: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E (Accessed on March 21, 2016).

[14] United Nations Department of Economic and Social Affairs (UNDESA) Financing for Development Office. (2015). Addis Ababa Action Agenda of the Third International Conference on Financing for Development (AAAA). Retrieved from: http://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf (Accessed on March 21, 2016).

[15] United Nations International Strategy for Disaster Reduction (UNISDR). (2016). The Science and Technology Roadmap to Support the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030. Retrieved from: https://www.unisdr.org/files/45270_unisdrscienceandtechnologyroadmap.pdf (Accessed on March 21, 2016).

[16] United Nations Major Group for Children and Youth (UN MGCY) Housing and Sustainable Urban Development (Habitat

III) Working Group. (2015). Response to Issue Papers. Retrieved from: http://childrenyouth.org/wp-content/uploads/2015/08/UN-MGCY-Response-to-Habitat-III-Issue-Papers.pdf (Accessed on March 21, 2016).

[17] World Urban Campaign (WUC). (2016). The City We Need 2.0, Towards New Urban Paradigm. Retrieved from: http://www.worldurbancampaign.org/sites/default/files/The%20City%20We%20Need%20TCWN%202.0_ADOPTED.pdf (Accessed on March 19, 2016).

[18] Posner, S. M., McKenzie, E., & Ricketts, T. H. (2016). Policy impacts of ecosystem services knowledge. *Proceedings of the National Academy of Sciences* (PNAS), 113(7), 1760-1765.

[19] Asia-Pacific Network for Global Change Research (APN). (2015). Proceedings of the Second APN Science-Policy Dialogue: Global Climate Change—Reducing Risk and Increasing Resilience. Kobe: APN.

[20] Rudd, M. A. (2015). Scientists' framing of the ocean science–policy interface. *Global Environmental Change*, 33, 44-60.

[21] The Organisation for Economic Co-operation and Development (OECD). (2011). Effective Modelling of Urban Systems to Address the Challenges of Climate Change and Sustainability. Global Science Forum, October 2011. Retrieved from: http://www.oecd.org/sti/sci-tech/49352636.pdf (Accessed on March 17, 2016).

[22] Sutherland, W. J., Bellingan, L., Bellingham, J. R., Blackstock, J. J., Bloomfield, R. M., Bravo, M., & Cope, D. R. (2012). A collaboratively-derived science-policy research agenda. *PloS one*, 7(3), e31824.